Engineering Visualization Theater

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The Engineering Visualization Theater (EVT) was established in 2001 as a venue in which to highlight important work being performed by LLNL's electronics and mechanical engineering personnel. It provides the infrastructure, tools, and visualization expertise necessary to help communicate engineering concepts through the production and presentation of high-quality audio/visual media.

As a presentation theater, the facility integrates a large projection video screen and surround audio system with a number of media sources including computer display output, digital disc recorder, VCR, DVD, and a video network feed from LLTN. Presenters can easily patch a laptop computer into the system or use the resident hardware to display their material. The room provides seating for 10 to 15 people and provides an unclassified environment suitable for small-group collaborations, software demonstrations, or video presentations.

As a media production workshop, the facility also enables the creation of high-quality visualizations to help engineers better communicate their ideas. The intent is to enhance good engineering with the best possible media tools and presentation techniques. High-end animation, compositing, and image processing software staffed by knowledgeable operators, provide the tools and expertise necessary to achieve this goal.

The hardware for this project includes two computers, a large screen display, a digital disk recorder, an S-VHS video recorder, a video monitor, a DVD player, surround sound speakers, an AV receiver, and a video switcher.

Software includes 3-D animation, compositing, image processing, video editing, DVD authoring, format conversion, and digital video compression.

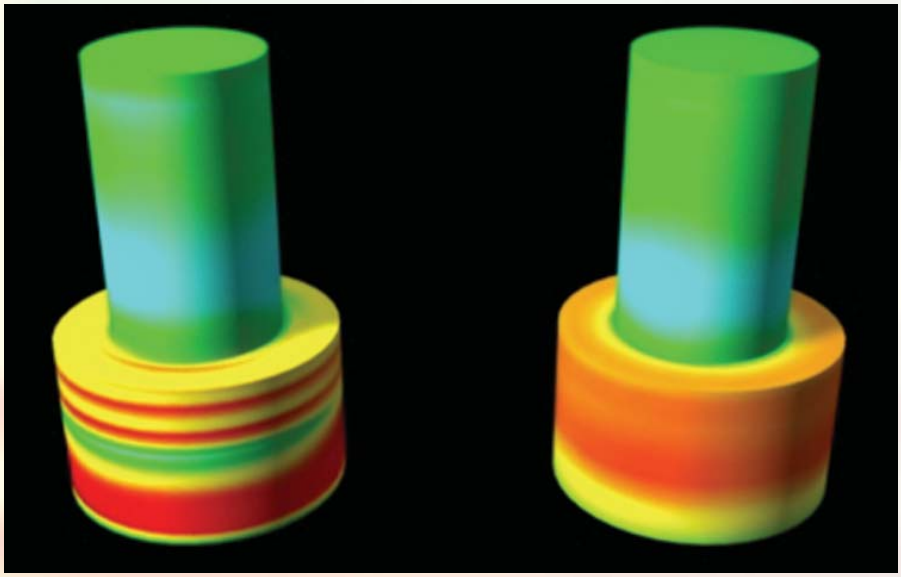

Figure 1. Illustration from EVT movie to help communicate the basic concept of as-built modeling.

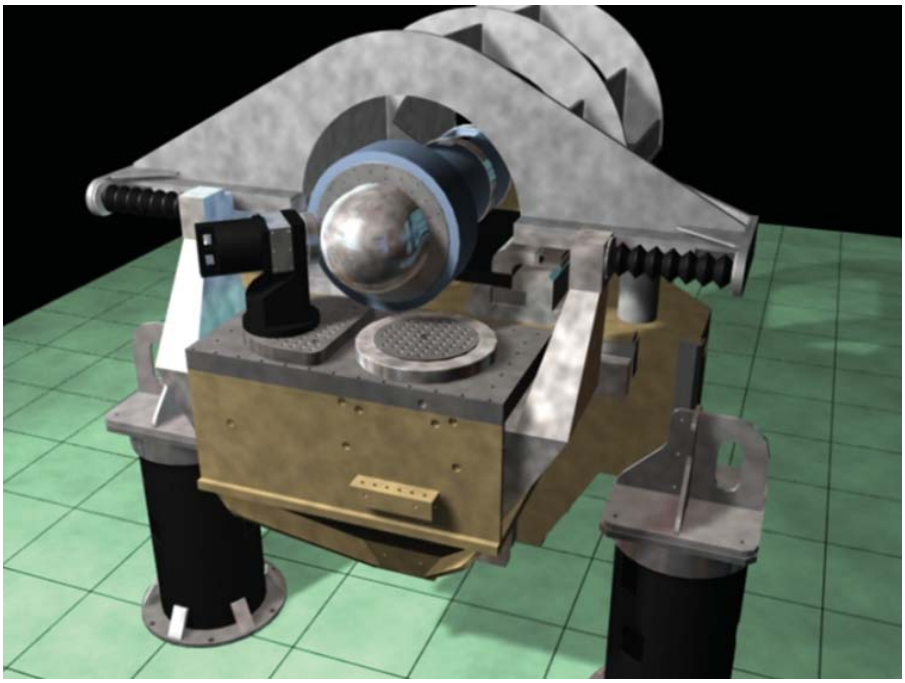

Figure 2. Illustration from short animation to help visualize in three dimensions how tool motion errors can introduce surface anomalies in precision machining processes.

Project Goals

The primary goal of the EVT is to assist engineers in communicating their ideas. Specifically, the EVT aims to provide the ability to fuse engineering analysis and data with professional animation to clearly articulate complex concepts.

Relevance to LLNL Mission

The need for good communication is ubiquitous and on-going. Engineering needs to be able to articulate its ideas and results in a modern venue commensurate with its abilities and those of its customers.

FY2004 Accomplishments and Results

Production activity this year focused on two new movies. Like past EVT productions, it was desirable that the movies should fill a programmatic need; demonstrate a path for visualizing computational results by incorporating actual data; showcase various types of animation to illustrate the creative possibilities and techniques that are available for engineers to use in future animation productions; and generally demonstrate the EVT's capability.

The first movie was a visual aid to help communicate the basic concept of as-built modeling, as well as to provide a short case study illustrating the process of model characterization and simulation (see Fig. 1). EVT personnel worked closely with a team of engineers to create and execute a storyboard that would convey the significance of as-built analysis and present the results in an interesting way.

In the second project, the EVT provided a number of short animations to help visualize in three dimensions how tool motion errors can introduce surface anomalies in precision machining processes (see Fig. 2). Computer animation was particularly effective in this case because of its ability to illustrate 3-D concepts directly. In each case, the result was a movie that brought engineering ideas to life in a form that was both instructive and visually compelling.

These and other animations were previewed for several key engineering personnel on the large video screen in the EVT facility. By combining creative media production with the display capabilities inherent in the assembled hardware, we believe that the presentation demonstrates the potential for using the EVT as a tool to effectively communicate engineering concepts.

FY2005 Proposed Work

The EVT intends to provide its services on an on-going basis.